WHAT IS CLAIMED IS:

1. A self-compacting, fiber-reinforced engineered cementitious composite comprising:

cementitious material comprising:

cement and sand;

at least one polymeric thickener;

at least one superplasticizer; and

water; and

from 0.5 to 10 volume % of hydrophilic reinforcing fibers.

2. The composite of claim 1 wherein the hydrophilic fibers comprise polyvinyl alcohol fibers.

3. The composite of claim 1 further comprising hydrophobic fibers.

4. The composite of claim 1 wherein the hydrophilic fibers have a tenacity of about 1000 - 2500 MPa.

5. The composite of claim 1 wherein the polymeric thickener and the superplasticizer are provided as a single chemical serving both the functions of the polymeric thickener and superplasticizer.

6. The composite of claim 5 wherein the hydrophilic fibers have a modulus (E) of about 30 - 60 GPa.

7. The composite of claim 6 wherein the hydrophilic fibers have a diameter of about 10 - 60 μm.

8. The composite of claim 7 wherein the hydrophilic fibers have a length of about 5 - 30 mm.

9. The composite of claim 1 wherein the hydrophilic fibers are coated with an oiling agent.

10. A method of making a composite structural material (engineered cementitious composite), said method comprising:

mixing from 0.5 to 10 volume % of hydrophilic reinforcing fibers with cementitious material comprising cement and sand, at least one polymeric thickener, at least one superplasticizer, and water.

11. The method of claim 10 wherein the hydrophilic fibers comprise polyvinyl alcohol fibers.

12. The method of claim 10 further comprising hydrophobic fibers.

13. The method of claim 10 wherein the hydrophilic fibers have a tenacity of about 1000 - 2500 MPa.

14. The method of claim 13 wherein the hydrophilic fibers have a modulus (E) of about 30 - 60 GPa.

15. The method of claim 14 wherein the hydrophilic fibers have a diameter of about 10 - 60 μm.

16. The method of claim 15 wherein the hydrophilic fibers have a length of about 5 - 30 mm.

17. The method of claim 10 wherein the composite structural material is case without the use of any external vibration.

18. The method of claim 16 wherein the composite structural material is case without the use of any external vibration.

19. The method of claim 9 wherein the hydrophilic fibers are coated with an oiling agent.

20. A method of making a composite structural material (engineered cementitious composite), said method comprising:

1) mixing powders of dry cement, sand, fly ash and defoamer;

2) mixing the dry powder mixture of 1) with water;

3) mixing an aqueous solution of cellulose compound with the mixture of 2);

4) mixing an aqueous solution of superplasticizer with the mixture of 3); and

5) mixing hydrophilic fibers with the mixture of 4).

21. The method of claim 20 wherein the components and the mixture of 2) are mixed for about 2 minutes, wherein the components of mixture 3) are mixed for about 5 to 10 minutes, and wherein the components of mixture 4) are mixed for about 2 minutes.

22. The method of claim 21 wherein additional water is mixed with the mixture of 5).

23. The method of claim 20 wherein the reinforcing hydrophilic fibers are pre-soaked in water before being mixed with the mixture of 4).

24. The method of claim 20 wherein the hydrophilic fibers are in random, discontinuous form.

25. The method of claim 20 wherein the hydrophilic fibers are provided in a bundle form.